REMARKS

Claims 1-12, 14-17, 31-32 and 35-43 are pending in this application. By this Amendment, claims 1, 12, 15 and 31 are amended and claims 13, 33 and 34 are canceled without prejudice or disclaimer. Various amendments are made to the claims for clarity and are unrelated to issues of patentability.

The Office Action rejects claims 1-17 and 37-43 under 35 U.S.C. §103(a) over U.S. Patent 6,653,741 to Sreeram et al. (hereafter Sreeram) in view of U.S. Patent Publication 2002/0079355 to Totino et al. (hereafter Totino). The Office Action also rejects claims 1-17 and 37-43 under 35 U.S.C. §103(a) over Sreeram in view of "Fluxless and Substantially Voidless Soldering for Semiconductor Chips" by Mizuishi (hereafter Mizuishi). The Office Action also rejects claims 31-36 under 35 U.S.C. §103(a) over Sreeram in view of Mizuishi. The rejections are respectfully traversed with respect to the pending claims.

Independent claim 1 recites preparing a bonding surface of a heat dissipating member, and bonding a thermal interface material including a metallic solder to the bonding surface, the thermal interface material to thermally couple the heat dissipating member to a heat conducting component by an impermanent attachment, the bonding including providing at least the thermal interface material in a vacuum chamber under vacuum conditions and heating the thermal interface material and providing a pressurized

inert atmosphere in the vacuum chamber to form liquid metallic solder, the pressurized inert atmosphere being from about 15 to about 40 pounds per square inch (p.s.i.).

The applied references do not teach or suggest all the features of independent claim 1. More specifically, the applied references as a whole do not teach or suggest that the bonding including providing at least the thermal interface material in a vacuum chamber under vacuum conditions, and heating the thermal interface material and providing pressurized inert atmosphere in the vacuum chamber to form the liquid metallic solder the pressurized inert atmosphere being from about 15 to about 40 p.s.i.

Sreeram does not teach or suggest features relating to a vacuum chamber having an inert environment. In discussing previous dependent claim 13, the Office Action asserts that Totino discloses a vacuum at a "fairly high" pressure. See Totino's paragraph [0016]. However, there is no suggestion in Totino for heating the thermal interface material and providing the pressurized inert atmosphere from about 15 to about 40 p.s.i., as recited in independent claim 1.

The Office Action's discussion on page 4 does not relate to the claimed pressurized inert atmosphere as recited in independent claim 1. Applicants also respectfully submit that it would not have been obvious to choose the claimed ranges through process optimization as asserted. The Office Action has not provided any reference showing the claimed pressurized inert atmosphere in combination with a thermal interface material.

The Office Action's mere reference to a vacuum and an inert atmosphere does not suggest to modify Sreeram's methodology so as to include a vacuum and an inert atmosphere. Rather, the only suggestion for the claimed features is provided in Applicant's own specification. Further, the Office Action's suggestions for the combination provided on page 4 do not relate to reasons to modify a method involving thermal interface material and a vacuum. The Office Action therefore lacks any proper motivation to modify Sreeram's disclosure. Accordingly, Totino does not teach or suggest the missing features of independent claim 1.

Furthermore, the Office Action (on page 7) also appears to rely on Mizuishi as teaching a pressure environment of 775 torrs. However, Mizuishi does not teach or suggest the claimed heating the thermal interface material and providing a pressurized inert atmosphere where the pressurized inert atmosphere is from about 15 to about 40 p.s.i. The Office Action (on bottom of page 7) appears to state that Mizushi's disclosure of 775 torrs are so close to the claimed features that one would expect the same properties. However, Mizuishi does not suggest the claimed pressurized inert atmosphere for the claimed thermal interface material. Merely because Mizuishi discloses 775 torrs, this does not suggest to modify Sreeram's disclosure as alleged in the Office Action. Thus, Mizuishi does not teach or suggest the missing features of independent claim 1. Thus, independent claim 1 defines patentable subject matter.

Independent claim 15 recites heating the metallic solder to a temperature of greater than or equal to the melting point of the metallic solder to form a liquid metallic solder, the heated temperature being about 10°C to about 300°C. Independent claim 15 also recites purging the vacuum chamber of oxygen gas and providing a pressurized inert atmosphere in the vacuum chamber, the pressurized inert atmosphere having a pressure of from about 0 to 100 p.s.i.

For at least similar reasons as set forth above, the applied references do not teach or suggest all the features of independent claim 15. The applied references also do not teach or suggest the claimed features of heating to a temperature of about 10°C to about 300°C when relating to the claimed metallic solder. Also the applied references do not relate to the claimed purging in combination with a metallic solder and a vacuum chamber. Thus, independent claim 15 defines patentable subject matter.

Independent claim 31 recites providing a metallic solder in a vacuum chamber under vacuum conditions by removing an amount of oxygen gas from the vacuum chamber, heating the metallic solder to at least a melting temperature of the metallic solder while in the vacuum chamber, and providing a pressurized inert atmosphere in the vacuum chamber while the metallic solder is in the vacuum chamber, the pressurized inert atmosphere having a pressure from about 0 to 100 p.s.i.

For at least similar reasons as set forth above, the applied references do not teach or suggest all the features of independent claim 31. Thus, independent claim 31 defines patentable subject matter.

Accordingly, each of independent claims 1, 15 and 31 define patentable subject matter. Each of the dependent claims depends from one of the independent claims and therefore defines patentable subject matter at least for this reason. In addition, the dependent claims recite features that further and independently distinguish over the applied references.

CONCLUSION

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance. Favorable consideration and prompt allowance of claims 1-12, 14-17 and 31-43 are earnestly solicited. If the Examiner believes that any additional changes would place the application in better condition for allowance, the Examiner is invited to contact the undersigned attorney at the telephone number listed below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this, concurrent and future replies, including extension of time fees, to Deposit Account 16-0607 and please credit any excess fees to such deposit account.

Respectfully submitted,
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